

ICETAR

THE 1st INTERNATIONAL CONFERENCE ON EDUCATIONAL THEORIES,
PRACTICES AND RESEARCH

TARBIYAH AND TEACHER TRAINING FACULTY, STATE ISLAMIC
UNIVERSITY SYEKH ALI HASAN AHMAD ADDARY

PADANGSIDIMPUAN ON 4TH - 5TH JULY, 2023

“Development of Post Pandemic Education to Face the Social Era 5.0”

Use of Alpha and Beta Tests as Indicators of Feasibility Books for Operating Tools in the Innovation and Practice Laboratory of Physics Learning, State University of Surabaya

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Abstract

The Innovation and Practice Laboratory of Physics Learning is one of the laboratories that is used to support several course activities. In general, laboratory facilities and infrastructure standards have been met, but we do not yet have an operating book for the equipment because the laboratory is still classified as a laboratory that has just started operating due to the COVID-19 virus. In order to support courses that use the tools in the laboratory, it is necessary to make a tool operation book to facilitate activities in the laboratory and make the tool user know how the tool works optimally to avoid damage to the tool. This research uses quantitative methods. The testing procedure in this study is Alpha Testing, namely validation tests by media experts, validation tests by material experts, instrument item trials in the form of beta testing instrument item validity tests and beta testing instrument reliability tests, and then Beta Testing, namely product usage testing. Data collection techniques using questionnaires. The data analysis technique used in this study is a quantitative data analysis technique. The results of the assessment of all aspects are measured on a Likert scale. Based on the results and discussion of the data that has been collected, it is concluded that the results of the alpha and beta tests can be used to measure the feasibility of a medium. The results of the test have three aspects, namely appearance, content, and language. The total average alpha test of the three aspects is 88%, and the total average beta test of the three aspects is 83%. The feasibility category is based on the Likert scale, namely the books for operating tools in the Innovation and Practice Laboratory of Physics Learning that have been made very feasible to use.

Keywords: laboratory; book; tools; equipment; media

INTRODUCTION

The laboratory is one of the important supporting facilities, which is very strategic in the implementation of the education system, especially in the higher education system [1][2][3]. In general, its role and function is to carry out educational, research, and community service activities [4].

According to Miftah and Hade [5] Means are anything that can be used as a tool in achieving a purpose or goal. While Infrastructure is everything that is the main support for the implementation of a process (business, development, and projects). Educational facilities and infrastructure are supporters of the teaching and learning process, so that the teaching and learning process can run well and smoothly [6]. The function of educational facilities or infrastructure is to make students feel comfortable and can motivate students in learning, so that the learning process can run smoothly and succeed as expected, namely to increase student achievement [7]. Therefore educational facilities and infrastructure are factors that must exist and be cared for because it is very important to use them to optimize teaching and learning activities.

The Innovation and Practice Laboratory of Physics Learning are one of the laboratories that are used to support several course activities, namely audio-visual physics learning, multimedia, and teaching skills & microteaching, both in the form of facilities, infrastructure, and competent human resources.

In general, the standards for facilities and infrastructure for Innovation and Practice Laboratory of Physics Learning have been met, but they do not yet have a tool operating book because the innovation and learning practice laboratories are still relatively new laboratories operating due to the COVID-19 virus. The COVID-19 pandemic itself has created challenges in pedagogical development [8][9][10][11]. Learning in the pandemic era is a different lesson [12]. Students and lecturers use distance learning during the pandemic [13]. Distance learning follows policies regulated by the government [14]. Because the pandemic era is over, and lectures are already running face-to-face, to support several courses that use the tools in the laboratory, especially Micro Lectures, it is necessary to make a tool operation book to facilitate activities in the laboratory and make tool users able to Knowing how to work the tool optimally to avoid damage to the tool. Microteaching serves as an initial discourse of discovery and deepening of conditions in the field (real class) and reflection with lecturers, teachers, and lecturers [15].

According to Abdul Hakim Sudarnoto [16], a handbook is a compilation of various types of information that is compactly arranged and ready to use, specifically in a field such as the handbook of physics. While the manual (manual book) contains instructions, guidelines, or procedures for doing something in stages. Referring to the meaning of the handbook, the handbook is useful as information, guidelines, instructions, references, and providing answers to questions in related fields, which are expected by the user of the handbook to work on a program in a directed, systematic, correct manner according to instructions, and easy to achieve. objective.

The equipment operation book is an important guide before operating the equipment [17]. With the equipment operating book, equipment users know how to operate the equipment. This reduces the risk of equipment damage. In addition, the equipment can also function optimally [18]. According to the demands of physics education learning, it emphasizes problem-based learning, so every physics education learning process requires laboratory-based activities. The role of the laboratory is very important in supporting the learning process [19]. So it is necessary to develop and complete some of the deficiencies so that the physics education laboratory can be used more easily in supporting the learning process.

Based on the description above, it is necessary to make efforts to optimize the use and service of Innovation and Practice Laboratory of Physics Learning, namely by making a tool operation book to facilitate the process of operating laboratory equipment in practicum and learning support activities, then to find out the feasibility of the book that has been made, do feasibility test in the form of alpha test and beta test.

METHOD

This research uses quantitative methods. The quantitative method is a research method based on the philosophy of positivism, used to examine certain populations or samples, data collection uses research instruments, data analysis is quantitative/statistical in nature, with the aim of testing established hypotheses [20].

The testing procedure in this research is using alpha and beta testing. Alpha testing technique is testing that aims to ensure that the media being tested can run smoothly without interruption of errors or bugs [21], while Beta Testing is testing that is direct in the actual environment by distributing questionnaires that will be calculated to draw conclusions about the assessment constructed media [22]. In Alpha Testing, what will be carried out are validation tests by media experts, validation tests by material experts, beta

testing instrument validity tests, and beta testing instrument reliability tests. In Beta Testing, what will be carried out is product usage testing. Data collection techniques using questionnaires. According to Santoso [23], research instruments determine the quality of research data. Questionnaires are data collection techniques that are carried out by giving a set of questions or written statements to respondents to answer [20]. The research instrument used in this study was a questionnaire sheet for the alpha test and a validation sheet for the beta test.

Before the instrument is used to test product usage, it is necessary to test the validity and reliability of the instrument. Instrument validation is intended to ensure that the instrument that has been made is feasible to use and indeed measures what it is intended to measure. The reliability test was carried out after the instrument validation was completed. Reliability tests are carried out to ensure that the instrument has a consistent (consistent) measure of what it should measure [24].

Validity test was carried out on each question item. The results of r count compared with r table. If r table < r count then it is valid. Test the validity of using the Product Moment correlation technique using the following formula [25]:

$$r_{xy} = \frac{n \sum X_i Y_i - (\sum X_i)(\sum Y_i)}{\sqrt{\{n \sum X_i^2 - (\sum X_i)^2\} \{n \sum Y_i^2 - (\sum Y_i)^2\}}} \dots (1)$$

Information:

- n : The number of X and Y data pairs
- $\sum X$: The total number of variables X
- $\sum Y$: The total number of Y variables
- $\sum X^2$: The square of the total number of variables X
- $\sum Y^2$: The square of the total number of variables Y
- $\sum XY$: The multiplication result of the total number of variables X and variable Y

As for the reliability test using the Alpha formula as follows [25]:

$$r_i = \frac{k}{(k-1)} \left\{ 1 - \frac{\sum \sigma_b^2}{\sigma_t^2} \right\} \dots (2)$$

Information:

- r_i : Instrument reliability
- k : Number of statement items
- $\sum \sigma_b^2$: The number of grain variants

σ_t^2 : Total variation [15].

After the reliability coefficient is known, it is then interpreted using the categories according to Arikunto [26], which are as follows:

Table 1. R value interpretation table

The value of r	Interpretation
Between 0,80 to 1,00	High
Between 0,60 to 0,80	Enough
Between 0,40 to 0,60	Rather Low
Between 0,20 to 0,40	Low
Between 0,00 to 0,20	Very Low

The data analysis technique used in this study is a quantitative data analysis technique. The valuation data obtained was analyzed descriptively qualitatively and used as a reference for revising the product, so as to produce a feasible product. The results of the assessment of all aspects are measured with a Likert scale. The Likert scale is a number of positive or negative statements about an attitude object. The main principle of the Likert scale is to determine the location of a person's position in a continuum of attitudes towards attitude objects ranging from very negative to very positive [24].

In this study the answers to the instrument items were classified into five choices. Each measured indicator is given a scale score of 1-5, that 5 is very good and 1 very bad. Then to see the weight of each response and calculate the average score with the following formula.

$$\bar{x} = \frac{\sum x}{n} \dots (3)$$

Information:

$\bar{x}$: Average score

n : Total value

Σx : Total score of each

Then the percentage yield formula can be calculated using the following formula.

$$Result = \frac{score\ total\ obtained}{maximum\ score} \times 100\% \dots (4)$$

For feasibility categories based on the following criteria [24].

Table 2. Feasibility criteria

Score in percent (%)	Feasibility criteria
81 – 100%	Very feasibility
61 – 80%	Feasibility
41 – 60%	Pretty feasibility
21 – 40%	Not feasibility
<21%	Very not feasibility

RESULT AND DISCUSSION

The research data was obtained from the results of filling in the instrument in the form of a questionnaire given to media experts, material experts, and a number of respondents or students to assess the feasibility results of the developed equipment use book. Before the respondents filled out the assessment instruments provided, each respondent first conducted a trial in the form of being given a draft book on the operation of Innovation and Practice Laboratory of Physics Learning and then after that tried directly using the tool without being given any further instructions.

Alpha test results, namely in the form of due diligence by media experts and material experts in the form of responses and assessments from media experts and material experts. The data results are shown in table 3 and the figure 1 below.

Table 3. Alpha Test Results by Media Experts and Material Experts

	Appearance	Content (material)	Language	Average
Media expert	87%	93%	80%	87%
Material expert	80%	89%	80%	83%
Average	83%	91%	80%	88%

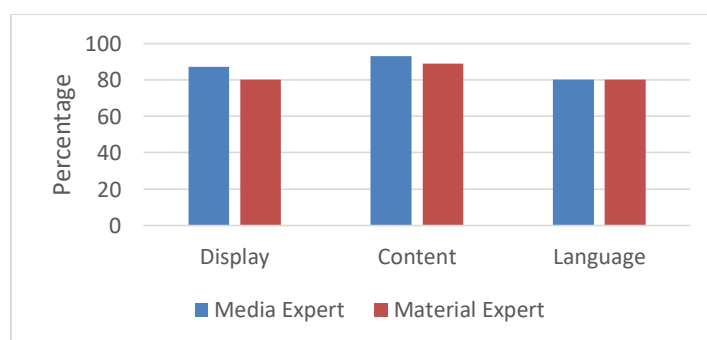


Figure 1. Alpha Test Results Diagram

Table 3 and figure 1 shows that the percentage of feasibility of the media in the alpha test, namely in terms of the appearance aspect of the media gets an average value of 83%, from the aspect of content (material) gets an average value of 91%, and from the aspect of language gets an average score of 80 %. The total average of the three aspects is 88%, which means that the feasibility category obtained is based on the Likert scale, namely the book on Innovation and Practice Laboratory of Physics Learning that have been made very feasible to use. Then from the results of the data obtained were analyzed and revised the product according to the suggestions.

After the product revision, validity and reliability tests were carried out on 20 students of Physics Education, Faculty of Mathematics and Natural Sciences, State University of Surabaya. Then the data obtained were analyzed using the Product Moment correlation technique with the help of the SPSS application to determine whether each instrument was valid or not before being used for trial use. Validity results are presented in Table 4 below.

Table 4. Validity test results

Question No.	R Count	R Table	Information
1	0,541	0,443	Valid
2	0,505	0,443	Valid
3	0,521	0,443	Valid
4	0,672	0,443	Valid
5	0,499	0,443	Valid
6	0,596	0,443	Valid
7	0,510	0,443	Valid
8	0,499	0,443	Valid
9	0,692	0,443	Valid
10	0,503	0,443	Valid
11	0,493	0,443	Valid
12	0,564	0,443	Valid
13	0,748	0,443	Valid

In this study, instrument reliability was measured using the alpha formula with the help of the SPSS application. This reliability measure indicates whether the test is reliable as a whole. The results of the reliability test are presented in table 5 below.

Table 5. Reliability test result

Reliability Test Results	Information
0,882	High Reliability

After the instrument is said to be valid and reliable, then the instrument can be trusted and can be used for beta testing, namely product usage testing.

The usage test was carried out at the Physics Education Study Program, Faculty of Mathematics and Natural Sciences, State University of Surabaya by 20 students. The test was carried out by giving operating books on Innovation and Practice Laboratory of Physics Learning and then students trying the tools directly. After that, students were given an instrument questionnaire containing 13 questions with three aspects, namely appearance, content (material), and language. The following are the results of the product usage test.

Tabel 6. Beta test result

No.	Aspect	Average
1.	Appearance	82%
2.	Content (material)	87%
3.	Language	81%
	Average	83%

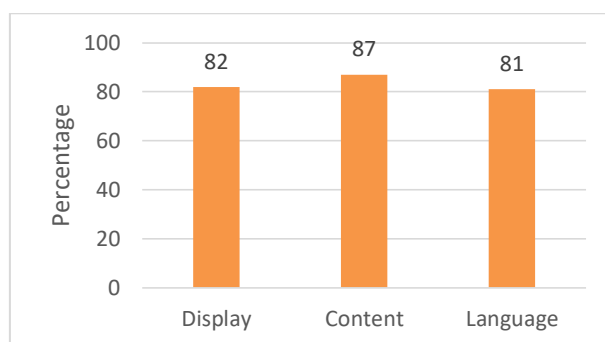


Figure 2. Beta test result diagram

Table 6 and Figure 2 shows that the percentage of feasibility from the beta test from the appearance aspect gets an average value of 82%, the content aspect (material) gets an average score of 87%, and from the language aspect gets a score of 81%. Then the total average obtained from these three aspects is 83%. The feasibility categories obtained based on the Likert scale are books on Innovation and Practice Laboratory of Physics Learning that have been made very feasible to use.

CONCLUSION

Based on the results and discussion of the data above, it can be concluded that the results of the alpha test and beta test can be used to measure the feasibility of a media. This is in line with research conducted by Siti Masripah and Linda Ramayanti [27] which stated that the results of alpha and beta tests on applications that have been designed have valid values or are by the desired expectations. The results of the alpha test are in the form of assessments from media experts and material experts from the appearance aspect obtaining an average value of 83%, from the content (material) aspect obtaining an average value of 91%, and from the language aspect obtaining an average value of 80%. The total average of the three aspects is 88%. The feasibility category obtained in the alpha test based on the Likert scale is the book on Innovation and Practice Laboratory of Physics Learning that have been made very feasible to use. Then in the beta test, namely the product usage test, the results obtained from the appearance aspect obtained an average value of 82%, from the content (material) aspect 87%, and the language aspect 81%. The total average of the three aspects is 83%. The feasibility category obtained in the beta test based on the Likert scale is the book on Innovation and Practice Laboratory of Physics Learning that have been made very feasible to use.

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